SPECIAL report

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Special Investigation Report
Forest Practices and Code Enforcement in a Cutblock near Schwartzenberg Lagoon in the Port McNeill Forest District

Summary Report
FPB/SIR/01S

Introduction

This is the Forest Practices Board's final report on a special investigation of a cutblock at Schwartzenberg Lagoon, near Seymour Inlet in the mainland coast portion of the Port McNeill Forest District. The block was harvested under timber licence T0127, held by Lone Tree Logging Ltd.

While conducting an audit of the Port McNeill Small Business Forest Enterprise Program in July 1998, Board staff flew over the cutblock and observed two landslides, one of which had entered an S3 class stream. Staff also noted that there was extensive windthrow along the stream, the block appeared not to be planted, and roadside slash piles had not been burned. Because the cutblock was not part of the small business program, it could not be examined within the audit.

The Board decided to conduct a special investigation of the cutblock to determine:

- whether the slides resulted from non-compliance with the Code
- compliance with the silviculture prescription with respect to planting the site
- compliance with the *Timber Harvesting Practices Regulation* requirement to dispose of slash
- government enforcement relating to the above three items

Because the block was approved in a forest development plan in July 1994, prior to the Code, the windthrow issue was not within the Board's jurisdiction to investigate. The other events have occurred since 1995 and are within the Board's jurisdiction.

Background

The forest development plan for the licence was approved in July 1994. All roads were constructed by May 30, 1995. Ministry of Forests records indicate that harvesting in

the portion of the licence area where the slides took place (cutblock 2) was completed during the summer of 1995, after the Forest Practices Code came into effect on June 15, 1995. Road deactivation took place to the satisfaction of the Ministry of Forests by November 20, 1995.

Landslides in the area were first identified by ministry staff and reported to the licensee in early October 1997. The licensee submitted a slide report to the Ministry of Forests on December 18, 1997.

The site was identified by the Board's audit team in July 1998. Board staff met with Ministry of Forests district staff and visited the site on September 2-3, 1998. Preliminary findings were provided to the ministry and the licensee, and Board staff spoke by telephone with representatives of Lone Tree Logging Ltd.

Discussion

Landslides

The outer region of the mainland coast, extending from Knight Inlet to beyond the Burke Channel, is known for prevalent natural slide occurrences during periods of high rainfall. Mean annual precipitation, largely in the form of rainfall, throughout this region is greater than 2500 mm per year. While conducting the site visit, Board staff observed several major natural slides within one kilometre of the site. The Ministry of Forests advised the Board that there are approximately 100 slide events annually in the district. Forestry activities can increase the risk of landslides in steep terrain.

In addition to the two slides initially observed by the Ministry of Forests, a third slide has since occurred within the cutblock. Two potential slope failures were also noted in an adjacent cutblock which is part of the same timber licence and was logged in 1996. The slides were open-slope failures and were not directly related to road construction practices. However, such occurrences were predicted or inferred by the silviculture prescription and a terrain assessment, and timely planting was prescribed to address slope stability concerns. Due to the passage of time since harvesting, there is no evidence to say whether or not the slides resulted from non-compliance with the Code.

The impact of the slides has been loss of growing site and local siltation into the S3 stream. Much of the slide area has eroded down to bedrock. It may be extremely difficult to effectively regenerate these areas without rehabilitation. A rehabilitation plan for the slides was requested by the ministry on October 7, 1997. The licensee submitted a plan to the Ministry of Forests on September 29, 1998. Rehabilitation has not yet occurred.

Regeneration

The approved silviculture prescription required planting within two years of the completion of harvesting to hasten green-up and also to address slope stability concerns. The block has not been planted to date.

Road Deactivation

While on the site, it was noted that road deactivation, involving the removal of a bridge over the S3 stream on Spur 1, did not provide for adequate sediment erosion controls and is resulting in sediment from embankments and ditchlines entering the stream.

Slash piles

The approved silviculture prescription stated that slash piles must be burned or disposed of by other means. A final harvest inspection report for cutblock 2 required that the licensee burn the roadside slash piles by December 31, 1996. On October 1, 1997 the Ministry of Forests wrote to the licensee requesting a burn plan by October 15, 1997. The letter also outlined the penalties for not disposing of the slash under section 10 of the *Timber Harvesting Practices Regulation*.

The *Timber Harvesting Practices Regulation* requires that, if slash is to be burned, it must be done by the first burning season after harvest. Harvesting was completed in 1995, and the slash piles have not been burned to date.

Government Enforcement

The Ministry of Forests has advised the licensee of its concerns on numerous occasions by letter, fax, and telephone. However, formal enforcement actions or remediation orders have not been implemented to date. The Board is aware that enforcement efforts are ongoing, and the Ministry of Forests and the licensee are currently discussing the situation. The Ministry of Environment, Lands and Parks has advised the Board that it was not aware of the slides.

Conclusions

The licensee has not met its obligations under the Code with respect to planting the site and disposal of the slash piles. It is difficult to say whether the slides resulted from non-compliance with the Code. However, work is required to rehabilitate the slides and prevent further sedimentation into the S3 stream.

If the slides are not rehabilitated, sedimentation into the S3 stream will continue and there may be further loss of growing site. The licensee may not be able to meet its regeneration obligations under the Code, and may have to amend the silviculture prescription as a result.

To date, the Ministry of Forest's enforcement measures have not rectified the situation. However, enforcement efforts are continuing and the licensee has now indicated a willingness to complete its obligations. The licensee has submitted a rehabilitation plan and a schedule for completing its Code obligations to the Ministry of Forests district office.

Recommendations

1. Lone Tree Logging Ltd. should complete all outstanding Code obligations with respect to timber licence T0127 as soon as reasonably possible.
2. Lone Tree Logging Ltd. should carry out its commitment to rehabilitation, as approved by the Ministry of Forests, to address sedimentation and loss of growing site.
3. The Ministry of Forests and Lone Tree Logging Ltd. should review the current sedimentation problem where Spur 1 crosses the S3 stream and implement any necessary sediment erosion controls.
4. The Ministry of Forests should ensure that Lone Tree Logging Ltd. meets its obligations under the Code and implement formal enforcement measures if the licensee continues to fail to meet its obligations.
5. The Ministry of Forests should take steps to ensure the timely completion of Code obligations and the implementation of preventive measures, such as timely planting, on sites with a high risk of landslides.

In accordance with section 186 of the Code, the Board requests that Lone Tree Logging and the Ministry of Forests advise it by November 30, 1998 of the steps that have been or are proposed to be taken to comply with these recommendations.

105-04371/

RESPONSE TO RECOMMENDATIONS

On November 27, 1998 the Forest Practices Board received a letter from the Ministry of Forests in response to these recommendations. The ministry advised the Board of the steps that have been taken by Lone Tree Logging and the ministry to address the recommendations in this report. The Board is satisfied that appropriate steps have been taken to implement outstanding Code requirements, address sedimentation problems, and ensure adequate regeneration of the site. The matter is now concluded.

Anyone wishing further information about this site should contact the Port McNeill Forest District at (250) 956-5000.

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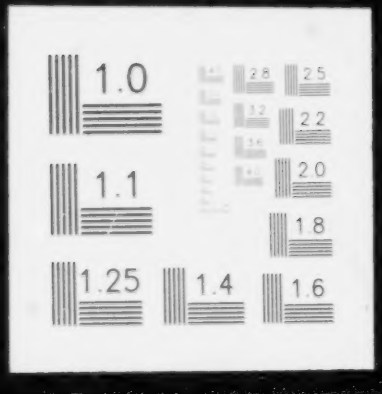
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Windthrow on West Island Timberlands

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Introduction

This special investigation examined windthrow management activities in the Franklin operating area of Weyerhaeuser Company Limited's (the licensee) West Island Timberlands Unit (West Island). The Franklin operating area is part of Tree Farm Licence 44, on Vancouver Island (see Appendix 1).

The investigation stems from a complaint investigation about windthrow (trees blown down by wind) on one of the licensee's cutblocks. The Board found the licensee had not complied with the Forest Practices Code (the Code) on that block, but that windthrow in the cutblock had caused no detectable damage to forest resources. That prompted the Board to examine the licensee's windthrow management activities over a larger area. The Franklin operating area was investigated to answer the following questions:

- Overall, did the licensee's 2001 and 2002 windthrow management activities in the Franklin operating area comply with the law?
- If not, did the non-compliance result in damage to forest resources?
- Were the desired results, as stated in approved plans, generally achieved on the ground?
- Has government's enforcement of the Code been appropriate with respect to prescribed windthrow treatments?

This investigation concludes that the licensee's windthrow management activities during 2001 and 2002 resulted in a high incidence of non-compliance with the Code. Substantial windthrow affected key environmental features and increased the risk of environmental damage. However, no actual damage has occurred as yet. Overall, the desired results stated in approved plans were generally achieved on the ground.

Government's enforcement of the Code concerning the prescribed windthrow treatments was appropriate, but the timing and thoroughness of post-harvest inspections could have been improved. Specifics about government's enforcement of the Code are described in Appendix 2.

Background

Much of the Franklin operating area is exposed to strong fall and winter winds from the Pacific Ocean. West coast winds are a natural disturbance in the area's forest, which means windthrow of standing timber is both common and expected. The effects can be positive; creating wildlife trees, adding large woody debris to streams and the forest floor, and mixing soils. On the other hand, it can also threaten forest health, complicate management of many forest resources and destabilize terrain. Therefore, forest practices legislation has required that forest development plans (FDPs) include measures to deal with forest health factors, including windthrow.

Licensees often also include prescriptions to reduce or manage windthrow in cutblock-level plans.

Falling boundary design and tree pruning can reduce windthrow risk. Nevertheless, the science of windthrow management remains inexact because wind speed and wind direction are difficult to predict, especially in mountainous terrain.

In 1998, the licensee (then MacMillan Bloedel Limited, subsequently acquired by Weyerhaeuser Company Limited) began to shift its forest management approach from clearcutting to "variable retention". A variable retention system leaves trees, as groups or dispersed individuals, throughout a cutblock. The objective is to maintain some structural features and forest influences of the pre-harvest stand in the harvested areas. Such retention can influence the potential for windthrow by exposing more timbered edges and greater numbers of dispersed trees. Until the newly-exposed trees adjust, they can be very vulnerable to windthrow.

During an audit of TFL 44 in 1999, the Board found that the licensee had failed to meet requirements for management of windthrow. On all of thirteen cutblocks where pruning had been prescribed, the licensee had not taken action to reduce the risk of windthrow. There was no substantial impact or harm to persons or the environment, but the frequency of the non-compliance created the potential for cumulative environmental impacts.

In response to the Board's recommendation, in early 2001 the licensee informed the Board that it had implemented actions to comply with Forest Practices Code requirements for windthrow management. The licensee planned to comply fully by October 31, 2001.

Throughout 2001, the licensee worked to revise its windthrow management strategy. The licensee's earlier strategy was simply to minimize all windthrow. Its new strategy pre-determined an acceptable amount of windthrow based on environmental consequence. This allowed the licensee to direct its windthrow management treatments to those cutblocks where resource values were more likely to be at risk. The strategy was designed in consultation with windthrow experts and Ministry of Forests (MOF) staff. As well as guiding future windthrow management prescriptions, the strategy was intended to reduce the licensee's obligation to complete windthrow treatments in low risk areas that had already been prescribed in approved plans but were now deemed to be unnecessary.

The Investigation

The Board initially reviewed 50 cutblocks for compliance with the *Forest Practices Code of British Columbia Act* (the Act), the law in effect for the period under investigation. The selected cutblocks had prescribed windthrow treatments (47 cutblocks) or identified wind-related issues (3 cutblocks). The investigation compared the treatments required under approved plans with the actual treatments undertaken by the licensee. A sample of 39 windthrow-prone cutblocks was examined further to confirm compliance, assess windthrow, and identify potential

consequences to forest resources. 12 of those 39 cutblocks were subsequently inspected more closely to assess the impact of windthrow on key environmental features.

Compliance with the Code

Forest Development Planning

Section 13(a) of the former *Operational Planning Regulation* required that a licensee record and evaluate forest health factors during forest development planning. On the windy west coast, this includes windthrow. The Board found that the licensee had collected considerable data about the incidence of wind and windthrow and recorded that information for planning purposes.

In 2001, the licensee developed an assessment card to collect windthrow information and evaluate windthrow risk on cutblocks. The licensee has also tracked windthrow occurrences and directions on a "Windthrow History Map". In addition, the licensee monitors windthrow annually, using more than 1600 monitoring stations. In 2003, the licensee had a windthrow expert study the winds near Pacific Rim National Park.

In addition to these specific projects, the licensee has supported research and development activities. Beginning in 2000, the licensee supported a Windthrow Hazard Probability Model and Mapping tool being developed at the University of British Columbia. West Island windthrow hazard maps have been produced for old-growth stands and the model is currently being tested for second-growth stands. In the winter of 2002-2003, the licensee evaluated the effectiveness of its tree pruning and topping treatments.

The Board finds that the licensee recorded and evaluated windthrow as a forest health factor during forest development planning.

Section 10(1)(c)(ii) of the Act required that an FDP specify measures that would be carried out to protect forest resources. Such measures include strategies to manage the potentially negative influences of windthrow on forest resources, especially where windthrow is common and expected.

The licensee's 2000-2004 FDP applied the licensee's earlier windthrow management strategy. That FDP identified that a windthrow assessment would be completed along with the silviculture prescription where windthrow was a concern, such as near sensitive resource values or where windthrow had occurred in the past. Additionally, where a terrain stability field assessment was required, a geoscientist would specifically consider windthrow related to potential instability. The applicable silviculture prescriptions approved under the 2000-2004 FDP incorporated recommendations from professional windthrow assessments.

The licensee's 2001-2005 FDP, in contrast, applied the licensee's new windthrow management strategy. That plan indicated that a certain level of windthrow was generally acceptable.

Mitigative measures would only be set out in cutblock design and harvesting prescriptions if windthrow was likely to result in inadequate conservation of forest resources. In those cases, the licensee planned to prescribe measures to reduce potential windthrow to a level that was likely to adequately manage and conserve those forest resources. The 2001-2005 FDP listed several strategies to deal with expected but unacceptable levels of windthrow.

The Board finds that both the licensee's 2000-2004 FDP and 2001-2005 FDP complied with Code requirements to specify measures to protect forest resources from the effects of windthrow.

Silviculture Prescriptions and Windthrow Management Activities

The licensee completed harvesting on 104 cutblocks in the Franklin operating area during 2001 and 2002 (50 in 2001 and 54 in 2002). About half of the cutblocks included a windthrow management prescription. Usually, the approved treatment was to prune windthrow-susceptible trees before the next autumn wind season, normally by October 31st.

In 2001, the licensee reviewed all its windthrow treatment obligations, applying its new windthrow management strategy to decide whether its originally prescribed windthrow treatments were really needed. The licensee confirmed the need for windthrow treatment in some of its cutblocks, modified it in others and, in many, decided the treatments were not needed. That meant that the licensee needed to obtain approvals of amendments to those previously approved silviculture prescriptions that contained windthrow treatments the licensee now considered unnecessary.

Throughout 2001, the licensee had discussed its refined windthrow strategy with staff from MOF. Ministry staff were generally supportive of the concept, but left approval to the district manager. The licensee expected that the district manager would approve the new strategy and the required plan amendments and, in August 2001, decided to implement its new windthrow strategy in anticipation of such approval. That management decision left a residual risk that the required silviculture prescription amendment approvals might not be obtained, leaving the licensee in non-compliance with the Code.

The licensee set out to complete, by the end of October 2001, only those windthrow treatments it considered necessary under its new strategy. It also began to prepare the many prescription amendments for modified and unnecessary treatments. Given the number of amendments that were to be submitted for approval, the licensee suggested to MOF a "batching" of amendments to speed the process. Discussions about process with MOF continued through the winter and, in March 2002, the licensee began submitting its proposed amendments to MOF.

In the meantime, the original deadline for the windthrow treatments passed. The licensee did not specifically advise MOF that it would not complete the previously-approved pruning prescriptions in blocks where such treatments were now considered to be unnecessary. Neither did MOF authorize an extension to the previously-approved pruning deadlines. As a result, as those deadlines passed, the licensee failed in 26 instances to carry out forest practices in

accordance with approved operational plans. That failure was a failure to comply with section 67 of the Act. It was impossible to bring the practices into compliance by retroactive approval of amended plans because there was no such mechanism in the Forest Practices Code.

Nevertheless, the licensee believes its actions complied with the law because its prescription amendments also served as reports to the district manager under section 36 of the Act. The Board therefore considered section 36 and also its relation to section 35.

Sections 35 and 36 applied in situations where performing the operations specified in a silviculture prescription would not achieve the results specified in the prescription, or where the requirements of a silviculture prescription simply cannot be met. In either case, the licensee had to submit either an amendment or a report to the district manager. If an amendment was required, the licensee was prohibited from carrying out any operation directly related to that amendment until it was approved. However, the Board considers that neither section applied to the licensee's circumstances. Section 35 would have applied only when operations specified in the prescription would not ensure specified results. Few of the licensee's plans specified results for the original windthrow treatments; those that did sought to generally reduce the likelihood of windthrow. The licensee told the Board that its treated trees largely remain standing, so that result was more likely to be achieved with treatment than without. In any event, under section 35, an approved amendment was required before the windthrow treatments were modified. Section 36 applied only when prescribed requirements could not be met. The licensee's decision to implement its new strategy was not because requirements could not be met. Rather, the licensee decided that the prescribed requirements were unnecessary.

In the normal course of administration, the licensee would have received approval for amendment of its prescriptions before the deadlines for approved treatments. That did not happen, in part, because of the large number of amendments that had to be submitted and processed. When it appeared likely that the approvals weren't going to be received on time, the licensee could have either completed the treatments or formally advised the district manager that it was not going to do the treatments required in its approved plans. However, the licensee did neither. Instead, it took the risk of deciding to not do what was required under the approved plan. That unilateral decision may have made operational sense, but it placed the licensee in non-compliance with the Act.

The Board finds that in 26 of 47 cutblocks, the licensee failed to comply with section 67 of the Act by modifying its windthrow treatments before those modifications were formally approved.

Did Non-compliance Result in Damage to Forest Resources?

Non-compliance can sometimes result in damage to the environment. In other cases, it can be procedural in nature with no actual damage. The Board considers non-compliance that has an effect on resources on the ground to be more serious than non-compliance of a purely procedural nature.

In this case, the licensee's decision to implement its revised windthrow strategy without district manager approval resulted in non-compliance. The licensee correctly anticipated that MOF would generally approve of the new windthrow management strategy and its implementation, but timing was a problem. By the end of 2002, MOF had approved 21 of 24 amendments for cutblocks where there was a failure to comply. That suggested that most of the non-compliances were simply procedural. However, the Board tested that assumption by checking for impacts on the ground. Board investigators (a geological engineer, a fisheries biologist, a forest harvesting consultant and a wildlife biologist) examined six non-compliant cutblocks that also had substantive windthrow associated with key environmental features such as streams, riparian areas, gullies and unstable terrain.

The Board found that windthrow in four of the six cutblocks had not resulted in any detectable damage to those key features. In the remaining two cutblocks, windthrow had created conditions that marginally increased the likelihood of stream sedimentation. Stream sedimentation is a natural process, but windthrow may significantly increase sediment delivery to streams by increasing the amount of soil exposed and available for erosion. In both cutblocks, pruning had been required within riparian management areas that were not harvested by the licensee. In the Board's opinion, windthrow in those two cutblocks increased the likelihood of significant stream sedimentation from a low-moderate to a moderate level. Actual environmental damage had not occurred in either cutblock, and might never occur, but the Board considers increased likelihood of significant sedimentation to be an adverse change.

Nevertheless, the Board could not link the increased likelihood of sedimentation to the licensee's failure to carry out approved windthrow treatments. That is because pruning and topping treatments reduce windthrow, but do not necessarily eliminate it. This was evident in other cutblocks that had windthrow even though required windthrow treatments had been done. In two of the non-compliant cutblocks, there was some increased risk from not treating retained trees, but the observed adverse change may have occurred even if windthrow treatments had been done as required. Moreover, one of the cutblocks was designed to recover windthrown timber from a previous catastrophic wind event. Although some post-harvest windthrow of retained trees also occurred, Board investigators could not reliably attribute the adverse change to one event or the other. On balance, the Board gave the benefit of the doubt to the licensee and assumed that the failure to windfirm these two cutblocks did not cause an adverse change.

The Board finds that the licensee's failure to comply with procedural requirements of the Code did not result in detectable damage to forest resources. An increased risk of damage in two cutblocks was not attributable with any certainty to the licensee's non-compliance.

Overall, Are Desirable Results Being Achieved?

In about half of the 39 cutblocks examined, wind had toppled 30 percent or more of the trees adjacent to at least one key environmental feature, such as a streamside area, unstable terrain or bear den. That level of windthrow had occurred both in cutblocks with and without windthrow

treatments. The observation confirmed that control of windthrow is still an inexact science in coastal British Columbia.

The licensee's revised windthrow management strategy assumes that not all windthrown timber is harmful. Windthrow contributes to biological diversity and replicates natural processes. The Board agrees with the licensee's approach of trying to manage the negative consequences of windthrow rather than trying to minimize windthrow.

Windthrow does not indicate a failure to achieve desired results. The licensee's windthrow strategy defines negative windthrow impact as damage that interferes with achievement of management objectives at the stand or forest level. Thus, a desirable result is considered to be achieved so long as the objective for a particular resource value was met, with or without windthrow.

However, sound forest management requires that achievement of desired results be related to explicit, measurable management objectives. For the Franklin operating area, the licensee's approved 2001-2005 FDP has a broad objective, "to limit the amount of operationally related windthrow." No limit is quantified and the objective is not linked to any particular resource value. The Board could not assess whether the licensee's results were contributing to achieving such an imprecise strategic objective. The Board therefore went on to examine whether desired results had contributed to achieving the more detailed and specific objectives in the licensee's approved silviculture prescriptions.

The effect of windthrow on streamside areas, unstable terrain and bear dens was evaluated in 12 cutblocks, including the six non-compliant cutblocks discussed earlier. Board staff selected areas of substantial windthrow where environmental problems, if any, would be most evident. Cutblocks with and without prescribed windthrow treatments were included.

Each of the 12 silviculture prescriptions complied with Code requirements, but the Board still could not translate silviculture prescription objectives into a specific, expected result on the ground. For example, 6 of the 12 plans specified retention of streamside trees to mitigate or prevent the impacts of harvesting on stream channel dynamics. In practice, virtually any effect on impact to a stream would meet such an amorphous objective. How could a meaningful result be measured? The retention of even one streamside tree would, to some extent, mitigate impact of harvesting on the stream channel. One could also argue that if that single tree was subsequently windthrown, it would add beneficial woody debris to the stream. Thus, almost any windthrow-related result could be considered consistent with the stated objective. Likewise, trees were to be retained near streams to enhance diversity or wildlife habitat. Again, how can such enhancement be reliably measured? The licensee maintained that windthrow invariably increased the structural diversity of the retained trees by creating new snags, and by increasing the level of woody debris on the ground. The licensee pointed out that, although windthrow might reduce habitat for some species, it would increase habitat for other species. As such, the licensee concluded that the function of the retained trees was met with or without

windthrow. By that reasoning, any amount of windthrow could be interpreted as enhancing diversity and the habitat of at least some species of wildlife.

Given the impracticality of assessing the effect of the licensee's strategy through achievement of the licensee's stated objectives, the Board next examined the actual consequences of windthrow.

Streamside Areas

The silviculture prescriptions for all 12 cutblocks included a general objective to protect, or mitigate, impacts on streams, wetlands, and lakes, and on the diversity, productivity and sustainability of habitat adjacent to riparian areas. 7 of the 12 plans also stated that retained trees in riparian management areas would have similar functions. A desirable outcome for streamside areas purposely left unharvested would logically be that windthrow in those areas would have no detrimental effect on stream channel integrity, fish and wildlife habitat or streamside vegetation.

The Board considered windthrow-related impacts as consequential to streamside areas only if windthrow had caused, or was likely to cause, obvious changes to the stream and streamside vegetation beyond that normally expected in an unlogged area. This involved professional interpretation, since unlogged streams also contain disturbed beds, eroding banks and windthrown trees. There are no generally-accepted benchmarks for natural disturbance to coastal streams and streamside areas, but there are commonly used indicators. The Board retained an expert in coastal stream disturbance to examine 20 streams in 12 cutblocks.

In 8 of the 12 cutblocks assessed, the Board found that windthrow had no consequential impact on stream channel integrity or fish habitat (two fish streams were observed). In these cutblocks, windthrown trees either bridged the streams or did not reach the stream channels. Most of these streams were narrow, low-gradient streams with gentle side slopes. Broken tops and limbs had reached the channel, but the amount of debris was similar to that expected in an unlogged coastal stream. Little sediment from windthrow-related erosion had reached the streams.

In the remaining four cutblocks, windthrow had an adverse consequence on stream channel integrity. (The Board noted that windthrow in two of these cutblocks was at least partially the result of catastrophic winds and probably beyond the licensee's ability to influence.) The affected streams typically had high, steep side slopes with evidence of unstable mineral soils. Windthrown trees had slid down the side slopes, releasing sediments either from the debris track or from impact with the opposite slope. None of the streams in these cutblocks were fish-bearing streams, but each had debris transport potential, hydrology concerns, or downstream fish habitat. Although tangible environmental damage was not apparent during the investigation period and may never occur, the Board found that windthrow near these streams did increase the potential for future cumulative environmental impact to downstream resources.

In 6 of the 12 cutblocks assessed, including the two cutblocks affected by catastrophic winds, the Board found that substantial windthrow had reduced the suitability of streamside habitat for those wildlife species requiring standing-tree structure. However, there was no consequential impact of windthrow on streamside shrub and herb vegetation in any of the 12 cutblocks assessed. The Board agrees with the licensee that such windthrow would have reduced habitat for some species, but improved it for others. In the Board's view, the significance of lost standing-tree structure is best determined at the landscape level, or relative to a particular species of interest. Such analysis was beyond the scope of this investigation.

Terrain

The licensee's stated objective for terrain stability was typically to maintain the long-term productivity of forest soils and mitigate impacts on water quality. Achievement of that general objective would again have been difficult to measure, so the Board retained a geological engineer to assess terrain stability to determine if windthrow had increased the likelihood of landslides or significant sedimentation.

Windthrow had increased the post-harvest likelihood of landslide or significant sedimentation in 6 of 9 cutblocks (3 cutblocks had no stability-related concerns to assess). The windthrow in those 6 cutblocks either decreased post-harvest terrain stability or was expected to accelerate the frequency of potential debris flows over time. Landslides and debris flows do occur naturally in the area and may or may not cause damage. In this case, the windthrow changed the likelihood of a potential event. Actual environmental damage had not occurred, but the increased likelihood itself is a detrimental effect.

Where a landslide directly impacts a feature or down-slope resource, there is little need for interpretation of effect. For example, just outside a seventh cutblock, where the licensee had prescribed no windthrow treatments, a major debris flow had occurred a few months post-harvest, destroying a bridge and adding sediment to a sensitive river. The debris flow and a catastrophic windthrow event were in the same location and occurred at roughly the same time. However, the Board could not clearly establish a direct link between these highly complex events, so the cause of the damaging debris flow was not determined.

Bear Dens

A wildlife biologist investigated whether bear dens that were to be protected by the licensee had been adversely affected by windthrow.

Three bear den trees were identified for protection in the 12 silviculture prescriptions. Two of the den trees remained standing despite windthrow of more than half the trees in the surrounding patch. Bear experts suggest that windthrow of surrounding trees probably makes use of the den tree less likely because nearby climbable escape-habitat is diminished. On the other hand, increased debris on or near the ground can mitigate the loss of climbable escape-trees, providing some climbable trees remain[11]. How many trees and how much debris is

needed for bear suitability depends on landscape factors that are beyond the scope of this investigation.

The third den tree was thrown over by wind, but appeared to retain the attributes of a viable den. The licensee's approved FDP committed to not salvage windthrow from around bear dens. Nevertheless, this den tree was marked for salvage, although it had not been removed.

In summary, all three den sites were clearly altered by windthrow, but there was no reliable indication of an adverse effect.

The Board finds that desired results, as stated in approved plans, were ambiguous and difficult to measure. However, they seemed to be achieved despite substantive windthrow. Nevertheless, windthrow did increase the risk of environmental damage in some cutblocks, particularly where streams had high, steep side-slopes, unstable or erodible soils, and debris transport capability. In other cutblocks, windthrow had reduced the suitability of habitat for wildlife that requires standing-tree structure in streamside areas. However, the Board could not determine whether the reduction was significant. Neither could the Board determine whether windthrow had resulted in an adverse effect on bear den-sites.

Conclusions

1. **In 26 of 47 cutblocks, the licensee decided not to implement approved windthrow treatments but did not receive approval of amendments to the applicable silviculture prescriptions before the treatment deadlines expired. Reducing windthrow treatments was consistent with the licensee's revised windthrow strategy that had been extensively discussed with the Ministry of Forests, and the licensee proceeded in anticipation of district manager approval. Nevertheless, for each of those 26 cutblocks, the licensee failed to comply with section 67 of the Act, which required that forest practices be carried out in accordance with approved operational plans.**
2. **The licensee's failure to comply did not result in detectable damage to forest resources. The increased risk of damage in two cutblocks was not attributable with any certainty to the licensee's non-compliance.**
3. **Overall, the desired results as stated in approved plans, although ambiguous, seemed to be achieved despite windthrow. Windthrow did affect the key environmental features examined, and in some circumstances increased the risk of damaging events. Nevertheless, there was no indication that any tangible environmental damage had occurred, or was about to occur, as a result of harvesting-related windthrow.**

Commentary

In this investigation, the Board had to consider whether practices that comply with the law might nevertheless result in damage. That concern arose in the context of the prescriptive *Forest Practices Code of British Columbia Act*, but applies even more strongly under the objectives-based *Forest and Range Practices Act* (FRPA). Procedural non-compliances of the type reported here simply would not be relevant under FRPA. The test under the Forest and Range Practices Act would be whether the licensee's results are consistent with objectives set by government. In such a regime, strategies and results must be precisely identified and achievement of those results must be measurable.

The point is illustrated by a damaging debris flow that was examined during this investigation. The flow may not have been preventable but, despite seemingly serious consequences, a precise cause could not be assigned. This suggests that determining accountability for such an event is difficult and will probably be an issue under an objectives-based regulatory regime.

The ultimate objective of managing windthrow is presumably to prevent significant impacts on forest resources and human property. However, such a broad aim could lend itself to management by many different strategies that could produce a broad and ambiguous range of results. That, in turn, would be difficult to monitor, particularly where determination of cause and effect is important. In this case, the licensee has developed a strategy to manage windthrow on the basis of acceptable consequence. The licensee is continuing to apply information from its windthrow monitoring and research activities to that strategy. Such an adaptive approach is positive, and should assist the licensee in defining evermore precise and measurable results.

Attempting to retain newly-exposed, standing trees in very windy places like parts of the Franklin operating area increases the potential for windthrow and therefore, the potential for adverse change. Nevertheless, the licensee's adoption of "variable retention" to maintain some forest structure in harvested areas is, in the Board's view, more desirable from an ecological and a social perspective than a simpler "log it so it won't blow down " approach. Managing for added retention in exposed and mountainous places is innovative, and thus prone to some failure, especially given the still-low predictability of wind speeds and direction, and the variable effectiveness of different windthrow treatments.

The licensee's approach to windthrow management continues to evolve. For example, in addition to pruning where necessary, the licensee now places its cutblock edges 25 to 30 meters outside the slope break of sensitive streams and gullies. Such "large patch" retention is also applied in other situations where windthrow is expected to be a problem. This refinement of assessment of the potential consequences of windthrow on different stream types reflects continual improvement of the licensee's windthrow strategy. The Board looks forward to monitoring the effectiveness of such strategies. Measurability of results will be paramount to monitor effectiveness under FRPA. If the test is ultimately whether forest resources are conserved, forest licensees and the Board will be challenged to articulate expected management

results precisely, and to monitor forest resources in ways that clearly link the results achieved to the management practices employed.

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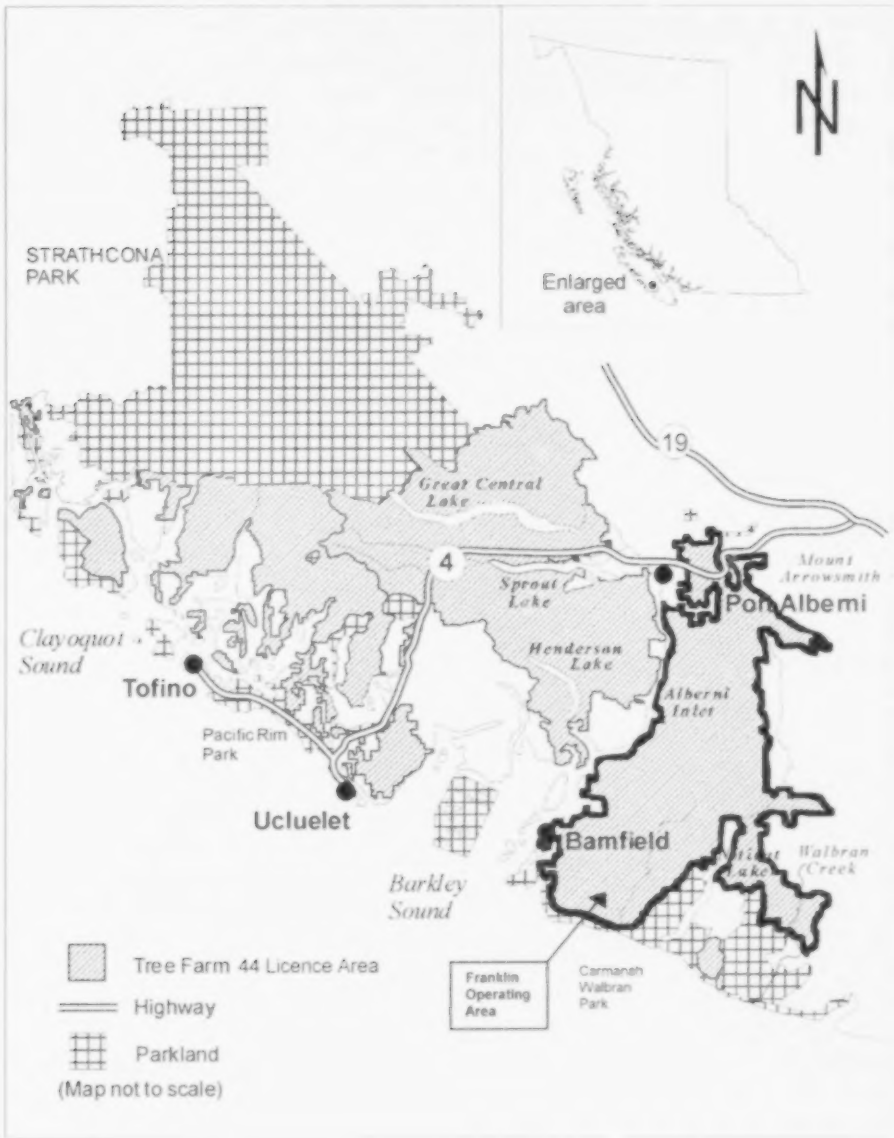
[i] Windthrow of Trees in the Walbran Valley, FPB Complaint Report IRC/95, April 2004

[ii] Tony Hamilton, Forest Wildlife Biologist, MWLAP, Victoria (pers. comm.)

Appendix 1: Franklin Operating Area

Weyerhaeuser Company Ltd.
Franklin Operating Area;
Tree Farm Licence 44



Appendix 2: Appropriateness of Government Enforcement

An element of the Board's special investigation of windthrow management in part of Weyerhaeuser Company Limited's (the licensee) Tree Farm Licence 44 on Vancouver Island was whether government enforcement of prescribed windthrow treatments was appropriate.

Ministry of Forests (MOF) MOF Compliance and Enforcement (C&E) staff first learned of possible windthrow-related contraventions of the Code in April 2002, when routinely advised by MOF planning staff that the licensee had submitted amendments indicating approved windthrow treatment deadlines had passed without treatment. C&E decided to delay a detailed investigation until all the licensee's proposed amendments were received. That C&E investigation is currently underway.

Since C&E is still investigating, the Board decided to look at how C&E normally scrutinized the licensee's approved windthrow management practices. The Board examined MOF records to determine the number and outcome of compliance inspections for 39 windthrow-prone cutblocks harvested by the licensee in 2001 or 2002.

C&E staff in the South Island Forest District review all approved silviculture prescriptions, as well as subsequently approved amendments. On the basis of risk to various resource values, C&E staff assign a target number of field inspections to each approved cutblock; usually from one to five. By early 2003, 14 of the 39 cutblocks examined had been inspected by C&E. The ministry had inspected the majority of higher risk cutblocks harvested in 2001 or 2002, but less than half of the moderate- and low-risk cutblocks had been visited. Although many cutblocks had yet to be inspected, the Board considered this approach to be appropriate because higher-risk cutblocks were inspected with greater frequency at apparently suitable times.

C&E normally provided inspection comments to the licensee as informal feedback to promote compliance and sound practice. However, while the MOF procedure is to inspect every cutblock at least once, the Board observed that not all inspections were timely relative to actual harvesting. In those cutblocks, a problem with forest practices is not likely to be discovered by MOF for some time. The risk of windthrow is greatest the first winter following harvest. Where problematic practices or non-compliance with prescribed windthrow treatments puts forest resources at risk, early detection and correction may avert potential damage before it occurs.

But even prompt post-harvest inspection may not reveal a problem with windthrow prescriptions. In most cases, licensee plans did not require pruning or topping treatments to be done until just before winter, whereas C&E inspections were scheduled on the basis of overall risk to forest resources, other priorities and staff availability. Under those criteria, a prompt post-harvest inspection was likely to occur before the deadline for windthrow treatment had

passed. Therefore, there was normally only a narrow window of opportunity for MOF to determine compliance with windthrow prescriptions prior to the first onset of winter winds. In several of the 39 cutblocks examined, the licensee had not completed prescribed windthrow treatments in accordance with its approved plans; a non-compliance with the *Forest Practices Code of British Columbia Act*. However, MOF compliance inspections did not identify any non-compliance with prescribed windthrow treatments. This was reasonable; for most, the compliance inspections occurred before the treatment deadline (in other words, before non-compliance could occur).

In one cutblock, MOF had an opportunity to observe non-compliance during a post-harvest inspection but did not identify the non-compliance. As contrast, in three other cutblocks, C&E staff made note of upcoming pruning obligations on harvest inspection records and then presented those records to the licensee as follow-up. In a fifth cutblock, C&E noted a possible non-compliance with a windthrow prescription, promptly followed-up with the licensee and resolved the matter. In the circumstances, feathering had been completed as planned but the surrounding area was subsequently windthrown, obscuring the treatment. There was no non-compliance.

During its review, Board staff noted that windthrow treatments, where prescribed, did not always appear on the compliance check-lists used by MOF for inspections. Field inspectors have a great deal to consider in relatively little time. The check-list helps assure that high risk items do not go unnoticed, so regular inclusion of prescribed windthrow treatments, where appropriate, would help to focus inspector's attention on those treatments.

Overall, MOF had a workable system in place to assign risk, but the post-harvest compliance check-list and timing of inspections could be made more effective. During its inspections, government's success at detecting potential non-compliance with windthrow prescriptions is low. However, it appears that where potential non-compliance with required windthrow prescriptions is identified, it is appropriately followed up.

The Board finds that government's enforcement of the Code concerning the licensee's prescribed windthrow treatments was appropriate, but timing and thoroughness of post-harvest inspections could be improved.